The taxonomic status of the Redshank *Tringa totanus* in Italy

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In a revision of the taxonomy of the Redshank *Tringa totanus* based on examination of a large series of specimens, Hale (1971) suggested that current European populations were the result of hybridisation between two previously separated populations that had evolved in different glacial refuges. Cinnamon birds, from eastern Russia, probably interbred with a dark brown population breeding in Western Europe, giving rise to a hybrid zone in which different colour forms now exist and different degrees of breeding plumage are assumed (many individuals retain winter feathers).

Museum collections around the world possessed just 11 birds collected in Italy or thereabouts during the breeding season, three of which were unsexed, making the country among the least represented in terms of numbers in the taxonomic analysis. In recent years three more specimens have become available, giving a total of 11 sexed birds. At the time, this was thought to reflect the very small numbers of Redshank breeding in Italy, but subsequent work by Valle *et al.* (1995) revealed a population of 1,076–1,169 breeding pairs, of which 90% were in the Lagoon of Venice. A more recent census, performed in 2001, produced an estimated *c.*1,600 pairs (Scarton & Valle 2004). The Redshank population in the lagoon is one of the most important in the Mediterranean Basin (Valle & Scarton 1996), and has been studied from 1985 until the present (2004). Despite its importance, the morphological characteristics of this population have not been studied previously.

Between 1993 and 2001 (none was measured in 1996) 153 different Redshanks were trapped at the nest, ten individuals on two occasions in different years, and the resultant mensural data are now available for taxonomic assessment. Here, these are compared with similar field data from Redshanks trapped in the British Isles and Denmark. Three dominant colour forms exist in Western Europe: a cinnamon form typical of Iceland and the British Isles, wherein nearly all birds retain some winter plumage, whilst in continental Europe grey and brown morphs co-exist (Harrison 1944).

Study area

The Lagoon of Venice covers *c.*55,000 ha and is connected to the Adriatic Sea via three entrances; it is the largest lagoon in the Mediterranean and hosts significant populations of breeding waterfowl at national level (e.g. Redshank, Oystercatcher *Haematopus ostralegus*, Sandwich Tern *Sterna sandvicensis*, Common Tern *S. hirundo*, Shelduck *Tadorna tadorna* and Pygmy Cormorant *Phalacrocorax pygmeus*), and for the first three-named species at Mediterranean level (Valle &

Scarton 1999, Scarton & Valle 2000). The northern and, especially, the southern parts of the lagoon possess hundreds of muddy, intertidal islets vegetated with halophytes (mainly *Puccinellia palustris*, *Limonium narbonense*, *Sarcocornia fruticosa* and *Spartina maritima*), which cover *c.*4,000 ha. A few of these islets (10–15 p.a.) are used by colonies of one or, more frequently, several species of Laridae (Black-headed Gull *Larus ridibundus*, a mean 120 pairs in 1997–99; Common Tern 940 pairs; Little Tern *Sterna albifrons*, 195 pairs; and Sandwich Tern 470 pairs: Valle & Scarton 1999). Here, Redshanks also nest in colonies (2–200 pairs), but many isolated pairs are scattered over other saltmarsh islets. The breeding season extends from March to June, with peak laying in late May (Valle & Scarton 1995). The species occurs in the lagoon year-round; in winter, January counts gave a mean 353 birds in 1996–2000 (Baccetti *et al.* 2002), although the majority of these are probably not Italian breeders.

Methods

Redshanks were caught using walk-in traps placed over the nests, and these were constructed with nylon tops to prevent any damage to the birds (Thompson & Hale 1989). Birds were weighed, sexed, measured (both wings, tail, bill length, tarsus length and tarsus width) and counts of breeding-plumage feathers in a square of 25 mm^2 on the mantle and breast, together with counts of the total number of breeding-plumage feathers amongst the scapulars (both sides) and tertials (both sides). For consistency, all these procedures were undertaken by one of us (WGH) accompanied by an Italian ringer (responsible for the ringing), and all birds were photographed dorsally and ventrally for future comparative purposes. Further details of the methodology can be found in Hale (1971). Sexing was undertaken mainly by examining the cloaca, which is enlarged in females at this season. This is reliable where comparisons with paired histories of individuals are known (Hale in prep.), but used exclusively, as here, occasional mis-sexing may occur.

Trapping normally took place at least four days after clutch completion and incubation had begun, in late May–early June at three colonies in the southern lagoon; in particular, most birds were from one colony, located near an old ruin (45°18'N, 12°11'E; Fig. 1), which was used when handling the birds.

Comparisons were made with two other populations trapped and measured by WGH: in the UK, 2,755 birds were measured in 1973–88, and 34 birds were measured in Denmark in 1975. Parametric (t-test, ANOVA and Tukey HSD for unequal sample size) or non-parametric (Mann-Whitney and Kruskal-Wallis) tests were used, according to the model of data distribution; ANOVA was also used for a few variables that were not normally distributed, given its robustness with respect to the assumption of the underlying populations' normality (Zar 1996). The statistics package STATISTICA 5.0 was used; probability level was set to $p=0.05$.

Figure 1. Study area, with saltmarshes in grey; location of Redshank *Tringa totanus* colonies indicated with an asterisk.

Results

A total 163 birds were trapped, 55 males and 108 females. Of these, two males (3.7% of the captured males) were trapped twice, after one and three years; eight

females (8%) were also recaptured, 1–7 years later. Table 1 shows the means of six measurements taken in the field of three different populations of Redshanks, in Venice, Britain and Denmark. Inter-sex differences in the three groups were highly significant (ANOVA, $p<0.001$ for weight, wing, tail and bill length; $p<0.01$ for tarsus length and tarsus width).

Measurements

Weight.—In males no significant difference was found between those from the Venetian lagoon and the British population, although both were very significantly different from Danish birds (Table 1, Fig. 2). In females there was a highly significant difference ($p<0.0001$) between all three populations (Fig. 2). Table 2 shows the mean weights of male and female Venetian Redshanks over eight years,

TABLE 1

Field measurements for three Redshank *Tringa totanus* breeding populations. Means that are not statistically different share the same letter. ANOVA and Tukey HSD test for unequal N, $p<0.05$.

Males		Weight $F_{2,1445}=29.9$	Wing $F_{2,1450}=24.5$	Tail $F_{2,1419}=12.2$	Bill $F_{2,1427}=15.3$	Tarsus length $F_{2,1451}=203.9$	Tarsus width $F_{2,1348}=19.3$
Venetian	Mean	128.98a	161.7a	64.8a	43.2a	54.2a	2.3a
Lagoon	S.E.	1.01	0.48	0.29	0.26	0.27	0.01
	n	55	55	55	55	55	55
Ribble Marshes	Mean	126.7a	164.8b	65a	41.1b	47.9b	2.42b
UK	S. E.	0.2	0.11	0.10	0.08	0.06	0.003
	n	1375	1380	1349	1357	1381	1328
Tipperne	Mean	113.0b	160.8a	60.5b	41.9b	48.6b	2.26c
Denmark	S.E.	5.4	0.56	1.03	0.46	0.56	0.03
	n	17	17	17	17	17	17
Females		Weight $F_{2,1479}=22.1$	Wing $F_{2,1496}=29.2$	Tail $F_{2,1473}=5.17$	Bill $F_{2,1468}=36.85$	Tarsus length $F_{2,1494}=433.7$	Tarsus width $F_{2,1439}=24.27$
Venetian	Mean	139.6a	165.4a	66.2a	43.9a	55.0a	2.38a
Lagoon	S.E.	1.24	0.36	0.25	0.18	0.23	0.01
	n	108	108	108	108	108	108
Ribble Marshes	Mean	134.3b	167.9b	66a	42.1b	48.4b	2.46b
UK	S. E.	0.2	0.11	0.12	0.06	0.06	0.003
	n	1357	1374	1351.0	1346	1372	1317
Tipperne	Mean	129c	163.4a	62.5b	43.4a	50.3c	2.41a
Denmark	S. E.	4	0.86	0.91	0.42	0.49	0.02
	n	17	17	17	17	17	17

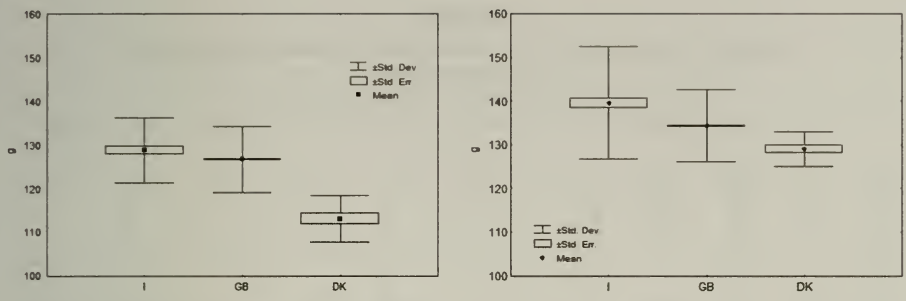

Figure 2. Weights of Redshanks (male above, female below) from the Lagoon of Venice (I), Britain (GB) and Denmark (DK)

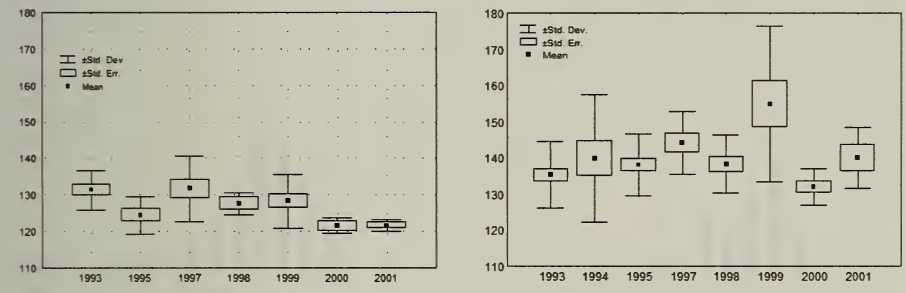

Figure 3. Weights of Redshanks (males above, females below) breeding in the Lagoon of Venice; a single male from 1994 is not included.

together with a total mean weight and ranges. These data show significant differences between years only for females (Fig. 3; ANOVA test; for males, a single bird from 1994 not included, $F_{6,47}=2.16$, $p>0.05$; for females, $F_{7,100}=3.95$, $p<0.001$). More extensive British data relating to the trapping of 2,755 birds over a period of 16 years (Hale in prep.) show very significant differences in weight between years, and it is likely that similar differences might occur in the Venetian population, were the data more extensive. Data from the Venetian lagoon indicate a mean difference of some 10 g in males and 22 g in females between years, and there were ranges of 35 g in males and 70 g in females between the lightest and heaviest individuals (Fig. 4). Eight of the ten retrapped birds showed little weight variation between seasons, but one had gained 17% over four seasons and another lost 22% over five seasons (Table 3). Fig. 3 shows that males and females do not always gain weight at the same rate in the same season, but this may be due to their feeding in different areas. The mean for all years shows a difference of 10.8 g between the sexes (Table 1), but this varied between 3.9 g in 1993 and 26.6 g in 1999 (Table 2).

TABLE 2
Weights (mean and standard error, in g) of Venetian Redshanks *Tringa totanus* in different years.

	1993	1994	1995	1997	1998	1999	2000	2001	Mean (all years)
Males	**131,4**	**146**	**124.5**	**131.7**	**128**	**128.3**	**121.5**	**121.7**	**128.8**
S.E.	1.5	2.9	1.8	2.7	1.8	1.9	1.5	0.9	1
n	13	1	8	11	2	15	2	3	55
Range	125–139		114–130	118–149	125–131	117–143	120–123	120–123	114–149
Females	**135.3**	**139.8**	**138.1**	**144.3**	**138.3**	**154.9**	**132**	**140**	**139.6**
S.E.	1.8	4.9	1.8	2.7	2.2	6.5	1.7	3.8	1.2
n	25	13	22	10	13	11	9	5	108
Range	121–154	122–174	120–155	134–164	127–160	132–190	127–138	130–151	120–190

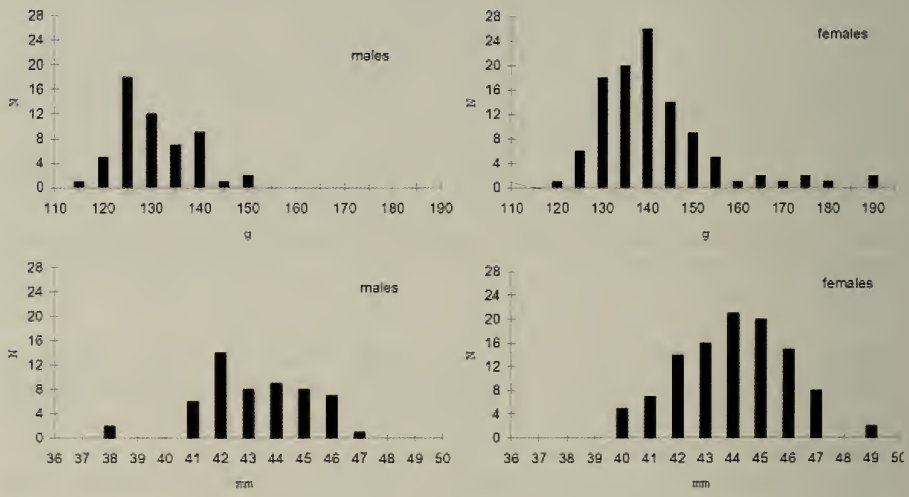

Figure 4. Weight (above) and bill (below) measurements for male and female Redshanks *Tringa totanus* breeding in the Lagoon of Venice.

Wing length.—Mean wing length of Italian birds (Table 1, Fig. 5) is not significantly different from that of Danish birds, but is significantly smaller than that of Redshank from the British Isles (Table 1) in both males and females (Tukey HSD test: $p<0.0001$).

Bill length.—Bill length (Table 1, Fig. 4) is greatest in the Venetian population and shortest in the British population, with significant difference between them (Tukey HSD test: $p<0.001$) in both sexes. Danish males are not significantly

TABLE 3

Retrapped birds; comparison of measurements (mm) and feather counts.
Dk = Chocolate-brown birds; Lt = Pale grey birds; Br = Cinnamon birds;
F = Full breeding plumage; P = Partial breeding plumage.

Ring no.	Date	Weight	Wing	Tail	Bill	Tarsus length	Tarsus width	Mantle	Breast	Scapulars	Secondaries	Morph
U21822	1993	127	165	65	43.5	56	2.34	27	18	9+9	6+6	Dk P
Female	1995	121	165	68	42	53	2.3	30	18	8+8	5+5	Dk F
U29493	1995	152	166	68	44	58	2.36	25	23	8+8	4+3	Lt P
Female	1997	148	169	67	42	53	2.35	25	26	8+8	5+4	Lt P
U41102	1997	145	162	67	43	53	2.32	22	20	8+8	4+4	Lt P
Female	1998	141	162	68	44.5	55	2.35	30	30	8+8	6+8	Lt F
U29474	1995	142	169	68	44	55	2.39	18	14	4+4	3+4	Br P
Female	1999	166	167	66.5	46	55	2.5	16	12	2+2	6+8	Br P
U29464	1994	162	165	66	44	56	2.43	27	22	8+8	7+7	Lt P
Female	1999	136	165	66.5	44	55	2.43	25	28	9+9	6+6	Lt P
U41260	1998	127	168.5	66	43	52	2.36	30	18	8+8	4+4	Dk F
Female	1999	134	166	65	44	52	2.35	15	30	9+9	5+5	Dk P
U41262	1998	139	170	66	43	57.5	2.39	30	25	8+8	4+5	Dk F
Female	2000	138	171	66	43	56	2.35	20	9	5+5	2+2	Dk P
U41109	1997	125	155	67	44	54	2.33	14	22	5+5	2+2	Lt P
Male	2000	123	157	64	45	55.5	2.34	5	7	1+2	1+1	Dk P
U21820	1993	122	163	65	42	53	2.22	33	25	9+9	4+4	Dk F
Female	2000	124	165	62	43	53	2.31	20	22	8+8	4+4	Dk P
U51943	2000	120	161	61	42	54	2.27	18	26	6+6	3+3	Dk P
Male	2001	123	161	63	42	52.5	2.3	15	8	5+5	0+1	Dk P

different from British males, and there is no significant difference between Venetian and Danish females.

Tail length.—There is no significant difference in tail length (Table 1, Fig. 5) between Italian and British Redshank, but Danish birds have a significantly shorter tail (Table 1; Tukey HSD test: $p<0.001$) in both sexes.

Tarsus length.—The largest and most significant difference occurs in tarsus length (Table 1, Fig. 6), where the Venetian population is on average more than 6 mm longer in both sexes than British birds, and more than 4.5 mm longer than Danish birds (Tukey HSD test: $p< 0.01$).

Tarsus width.—The British population has a significantly (Tukey HSD test: $p< 0.01$) broader, heavier tarsus than Venetian birds (Table 1, Fig. 6) in both sexes and in this respect is similar to Icelandic Redshank. Danish males have a significantly

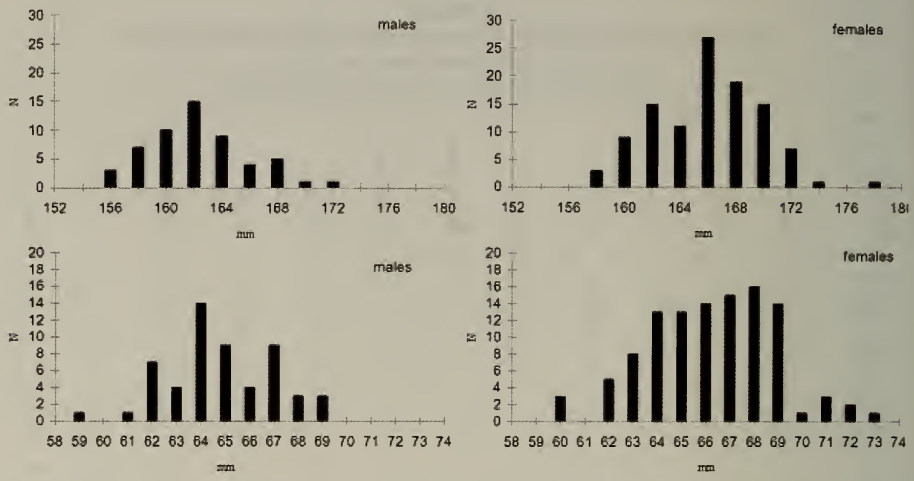

Figure 5. Wing (above) and tail (below) measurements for male and female Redshanks *Tringa totanus* breeding in the Lagoon of Venice.

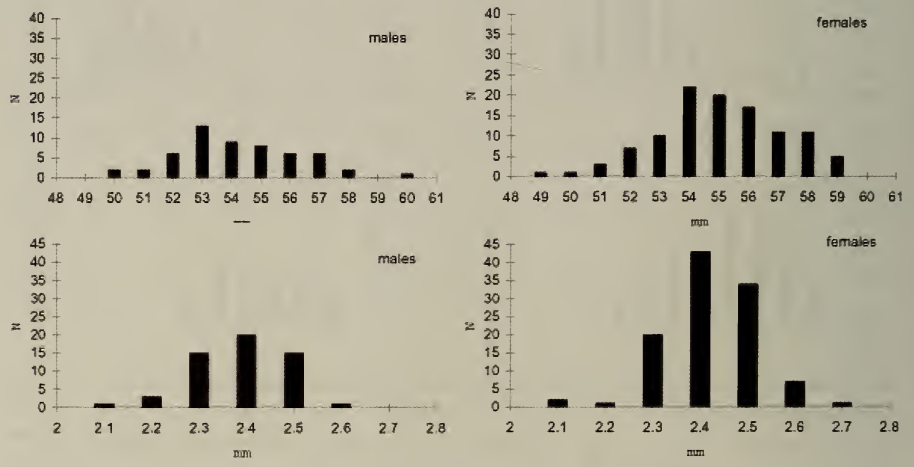

Figure 6. Tarsus length (above) and tarsus width (below) measurements for male and female Redshanks *Tringa totanus* breeding in the Lagoon of Venice.

narrower tarsus than either of the other populations (Tukey HSD test: $p < 0.01$). In females there is no significant difference in width between Venetian and Danish birds, but there is a significant difference between both populations and British Redshank (Tukey HSD test: $p<0.01$).

TABLE 4
Distribution of plumage types in live Venetian Redshanks *Tringa totanus* and Italian museum specimens. BP = breeding plumage.

	DARK BROWN		PALE GREY		CINNAMON	
	Full BP	Partial BP	Full BP	Partial BP	Full BP	Partial BP
Museum skins	2	1	2	3	0	3
	27%		45%		27%	
Lagoon of Venice 1993–2001	22	65	10	48	0	18
	53%		36%		11%	

Plumage variation

Of the 163 breeding Redshank trapped on the Venetian lagoon (including the ten retraps) only 32 had full breeding plumage (Table 4). In all others (131) some winter feathers were retained, and the extent of breeding plumage in Venetian Redshanks was very similar to Danish birds. Of the six counts taken, there was no significant difference between Italian and Danish males, but there was significant

Figure 7. The colour forms of Redshank *Tringa totanus* breeding in the Lagoon of Venice; left to right i) chocolate-brown morph, ii) pale grey morph, and iii) cinnamon morph.

TABLE 5
Breeding plumage counts in three populations of Redshanks *Tringa totanus*.

		Mantle (max. 30)	Breast (max. 30)	Scapulars (max. 16)	Secondaries (max. 16)
Lagoon of Venice	Males *n*=56	**18.63**	**18.72**	**13.19**	**6.13**
	S.E.	1.15	0.94	0.26	0.27
	Females *n*=108	**19.6**	**18**	**13.34**	**7.17**
	S.E.	0.78	0.69	0.22	0.21
Ribble Marshes UK	Males *n*=1,353	**6.9**	**7.5**	**5.03**	**0.96**
	S.E.	0.18	0.18	0.06	0.03
	Females *n*=1.346	**6.8**	**6.63**	**5.52**	**0.99**
	S.E.	0.17	0.16	0.06	0.03
Tipperne Denmark	Males *n*=17	**17.6**	**18.4**	**12.5**	**6**
	S.E.	2.43	1.64	0.57	0.47
	Females *n*=17	**14.5**	**16.7**	**7.82**	**5.82**
	S.E.	1.93	1.84	0.48	0.42

difference between these populations and British birds in all six counts (Tukey HSD test: $p<0.01$). In females the breast count and that of the left secondaries showed a significant difference (Tukey HSD test: $p<0.01$) between Danish and Italian birds on the one hand and British birds on the other; counts of the mantle, right scapulars and right secondaries showed significant differences between all three populations (Tukey HSD test: $p<0.01$), and in the case of the left scapulars Italian birds were significantly different (a larger count) from those of the other populations (Table 5).

Three colour forms could be recognised among trapped birds (153) in Venice (Table 4, Fig. 7); a small proportion (18) resembled dark cinnamon-coloured birds from the British Isles, whilst the majority (135) were chocolate-brown (87) and grey-brown (58) birds—dark and light forms of the nominate race (Harrison 1944).

Ten retraps were made during the present work, seven of which had less breeding plumage in years after the initial trapping, two had more breeding plumage and one showed no change after two years. Whilst there is no difficulty separating chocolate-brown from pale grey morphs in full breeding plumage, it is more difficult when only a small amount of breeding plumage is present and, in these circumstances, cinnamon-coloured birds are not easily separable from the grey morph. In one case, a retrapped bird (U411099) was allocated to the grey-

TABLE 6
Comparison of mensural data (mean and s.d., in mm) of southern breeding populations of Redshank *Tringa totanus*.

	Lagoon of Venice live birds	Italy	Bulgaria/Greece specimens	Spain
Males				
Wing length	**161.7**	**161.4**	**158.7**	**157.8**
	3.6	2.2	3.0	3.6
Tail length	**64.8**	**61.6**	**64**	**63.4**
	2.2	1.5	1.6	2.6
Bill length	**43.2**	**42.2**	**40.5**	**43**
	1.9	1.35	2.15	2.4
Tarsus length	**54.2**	**50.2**	**50.7**	**50.8**
	2	2.08	1.7	2.8
Tarsus width	**2.3**	**2.19**	**2.14**	**2.13**
	0.1	0.09	0.05	0.1
n	55	5	6	10
Females				
Wing length	**165.4**	**160.8**	**161.3**	**159.1**
	0.36	3.54	2.2	1.8
Tail length	**66.2**	**65.4**	**62.8**	**61.9**
	0.25	1.8	3.2	2.3
Bill length	**43.9**	**48.29**	**43.9**	**44.5**
	0.19	5.3	2.2	1.1
Tarsus length	**54.9**	**49.01**	**51.9**	**51.1**
	0.23	1.4	4	2.5
Tarsus width	**2.38**	**2.19**	**2.12**	**2.09**
	0.01	0.04	0.1	0.1
n	108	7*	4	5

*= 6 for wing length

brown form on initial capture, but was clearly chocolate-brown, with significantly more breeding plumage, three years later (Table 3). The other nine retraps exhibited the same type of breeding plumage as when first trapped, suggesting the possibility of moulting to a different form of breeding plumage, at least between the two forms in question. Further work is needed to establish whether the explanation is really the misidentification of the colour form due to the small amount of breeding plumage, or the less likely scenario of a colour change.

Comparison with museum specimens

When working with specimens there is always the possibility that birds collected during the breeding season may not necessarily be breeders. In the case of the 11 'Italian' skins examined by Hale (1971) none was labelled as certain breeders. The present work, during which known breeders were examined, provides a basis on

which to check how representative of the Italian breeding population was the museum sample (Table 6).

Based on the data in Table 6, there is no reason to consider the museum sample to be of birds other than breeders, but the long series of known breeders shows that there is probably a much higher proportion of chocolate-brown birds in the breeding population (53%) and a smaller proportion of cinnamon birds (11%). The Venetian breeding population is more like that of Spain in the distribution of the different colour forms than suggested by the museum sample. The ratio of 87 : 58 (chocolate-brown : grey morph) is not different from the ratio of 11 : 5 in Spanish skins (Yates corrected $P^2=0.17$, $p>0.05$). Samples from Greece and Bulgaria were too few to provide meaningful comparison. However, it is probable that all southern European breeders have a similar distribution of colour morphs throughout the Mediterranean, with the chocolate-brown form predominating.

Given drying in skins there is also a close similarity in measurements, except tarsus length. As it is bone length that is being measured, a contraction of 3.9 mm in males and 5.8 mm in females would not be expected (Table 6). Comparing the live Venetian population with Italian skins, for males, wing, tail and bill lengths do not show significant differences (Kruskall-Wallis test, $P^2=5.0$, 2.7, 1.7, $p>0.05$ in all cases); contrastingly, tarsus length and tarsus width show significant differences, with Venetian birds having longer and thicker tarsi (Kruskall-Wallis test, $P^2=14.8$ and 26.7 respectively; $p<0.01$ in both). Among females only tarsus width shows a significant difference (Kruskall-Wallis test: $P^2=10.1$, $p<0.05$), with Venetian birds having thicker tarsi, but this is probably accounted for in both sexes by drying in skins. With the exception of tarsus length, exceptionally long in Venetian birds, measurements and plumage characteristics of Venetian birds are similar to other southern breeders.

Discussion

Immediately after egg laying Venetian Redshanks are heavier than other sampled populations (British and Danish, Table 1), although Icelandic Redshanks are heaviest (males *c.*140 g, females 167 g: Hale *in* Cramp & Simmons 1983). British breeders, which are significantly longer winged (Table 1), are lighter at this time (males 126.7 ± 0.2 g, females 134.3 ± 0.2 g). British birds are largely sedentary in winter (Hale 1973) and these weights probably reflect late-winter/early-spring feeding conditions; this might indicate much different feeding conditions for the Italian population, either in the Mediterranean or in Africa. Thus far, no recoveries away from the ringing site of the 153 individuals ringed during this work have been reported.

Danish Redshanks, which have very similar wing length to Venetian birds (Table 1), weigh significantly lighter in May, males having a mean weight of 113 ± 1.3 g, and females 129 ± 0.98 g. Whilst these weights may reflect longer migration in Danish birds, other explanations are possible, e.g. little winter movement in a proportion of the Danish population that experiences different (possibly poorer)

feeding conditions. Venetian Redshanks are undoubtedly heavy relative to wing length, which is clearly shown in Fig. 2, where separate male and female comparison is made between British, Danish and Italian birds. In both sexes there is significant difference in weight between the three populations.

Weight in Redshanks varies during the year (Hale 1980), peaking in autumn, decreasing in early winter and increasing again in late winter/early spring. Spring weights are affected by winter feeding and individuals undertaking long migrations use reserves and are therefore lighter in weight. Clearly, both feeding and migration conditions vary annually, thus variation in weights might be expected between years. However, no significant differences in weight were detected in either sex over a 16-year period in the British study (Hale in prep.), making it likely that breeding-season weight is a population characteristic uninfluenced by environmental factors.

Wing length of Venetian birds is unusually short considering weight and in this respect they resemble Scandinavian birds rather than the British/Icelandic complex (Hale 1971), suggesting a closer relationship to the typical form than to *T. t. robusta* or the British population. The uniquely long tarsus of Venetian birds is difficult to explain. It is possibly associated with feeding conditions in the lagoon, where fluctuations in tide height are much smaller than those experienced by birds outside the Mediterranean. Under these conditions tides expose much smaller mudflats, so that Venetian Redshanks may have to wade to obtain adequate food. In contrast, British Redshanks obtain the majority of their food from exposed mud (in estuarine-breeding populations) and from the ground surface (inland).

It has been suggested (Hale 1971) that the lack of breeding plumage is characteristic of the western hybrid zone in the Redshank, and the findings of the present study in this respect agree well with those from the study of specimens. Also in agreement with previous work is the distribution of the colour forms (Fig. 7), three being recognisable: i) chocolate-brown birds, ii) grey-brown birds, and iii) cinnamon birds similar to those breeding in the British Isles; the former two groups are the dark and light phases in continental birds recognised by Harrison (1944). However, that these two forms co-exist lends support to the theory of a Western European hybrid zone. Hale (1971) suggested that the hybrid zone spread north during the 19th century and that birds typical of the hybrid zone replaced the original form (chocolate-brown). Whilst prior to 1900 more than 90% of northern Scandinavian birds were the chocolate-brown morph, post-1900 this had reduced to 60%. Interestingly, Ottvall (2002) found genetic differences between northern and southern populations of Redshank in Scandinavia, which is consistent with the morphological data, and the results also suggest that southern populations sampled belong to a panmictic grouping. In Italy, in the present day, more than 50% of breeders are the chocolate-brown form (Table 4), which seems to be disappearing from Scandinavia.

Hale (in prep.) will show that in Redshanks breeding in northern England the degree of breeding plumage, and consequently the number of retained winter

feathers, may vary in individuals between years. This is not age-related, as the extent of breeding plumage may increase or decrease annually, as it does in Venetian birds (Table 3). Nor is it related to early breeding, as suggested by Whitfield (2003), but it is apparently related to distance migrated, with those sedentary in winter showing little breeding plumage, whereas migrants attain more breeding plumage the following season the further they travel.

The small amount of breeding plumage that some Venetian birds attain may indicate that they winter in the Mediterranean, whereas those with very full breeding plumage probably penetrate far south in Africa, e.g. Nigeria and Cameroon (Hale 1973). Thus far, no recoveries have been reported for breeders ringed in Venice, but the higher mean counts of breeding plumage in these birds suggests that they undertake a longer migration, on average, than do British birds.

Linné (1766) originally described *Tringa totanus* as having a grey-brown body and, as previously noted (Hale 1971), this cannot refer to chocolate-brown birds of northern Scandinavia and the predominant morph in Venice. Since these are apparently not the typical form it is unjustifiable to refer to them as *T. t. totanus* unless, as suggested earlier as a possibility, an individual may adopt characteristics of both morphs during its lifetime. As three morphs co-occur in the Venetian population, at the southern fringe of an apparent hybrid zone, these birds are probably more correctly referred to as *T. t. totanus* x *ussuriensis*.

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Remarks on Sichuan Wood Owl *Strix uralensis davidi* from observations in south-west China

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Sichuan Wood Owl (Père David's Owl) *Strix uralensis davidi* was described, by Sharpe (1875) as *Syrnium davidi*, from the type, a male, taken at Mupin, in Sichuan province, China, and named for the French missionary, Armand David, who discovered this owl during his first collecting trip to western China, in 1866. (J. Verreaux labelled the specimen *Ptynx fulvescens*, considering it to be an example of the rufous subspecies of Ural Owl, known from Japan (now *Strix uralensis fuscescens*), but in older literature it also acquired the synonym *Syrnium rufescens*. This led to much confusion, as *Strix fulvescens* (previously *Syrnium fulvescens* Sclater & Salvin) is a quite different owl species from Middle America, as Sharpe (1875) had already noted.) Even now, our knowledge of Sichuan Wood Owl's distribution, ecology, reproduction, voice and behaviour is very poor. Consequently, data on status, conservation and taxonomy are rather vague (Holt *et al.* 1999, König *et al.* 1999). Most descriptions of this owl and its taxonomy are traceable to observations and specimens from the late-19th and early-20th centuries. Published distribution maps are still, of necessity, rather vague, but this owl is known to inhabit primeval forests in montane Sichuan and south-east Qinghai (Cheng Tso-hsin 1987), and although not previously known from Gansu (Liu Naifa 1995), where this owl was first detected in 1995 (Sun *et al.* 2001), recent records indicate that it occurs in extensive woodland across southern Gansu, as far as the border with